Journal of Solution Chemistry 2015 vol.44 N3-4, pages 811-823

Enthalpies of solution and enthalpies of solvation in water: The anion effect in ionic liquids with common 1-ethyl-3-methyl-imidazolium cation

Varfolomeev M., Khachatrian A., Akhmadeev B., Solomonov B., Yermalayeu A., Verevkin S.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Springer Science+Business Media New York 2015. Abstract Thermochemical studies of ionic liquids (ILs) in aqueous solution were carried out using solution calorimetry. Heat effects of dissolution in water at 298.15 K and molar limiting enthalpies of solution were measured for ILs having a common cation, 1-ethyl-3-methyl-imidazolium, connected with different anions: diethylphosphate, ethylsulfate, tetracyanoborate, thiocyanate, and trifluoroacetate. Molar enthalpies of solvation of ILs in water were derived from experimental data for solution and vaporization enthalpies. Enthalpic data were correlated with ionic liquid specific parameters and descriptors. The best correlation was observed with hydrogen-bonding interaction energies. This result confirmed that hydrogen bonding is one of the main types of intermolecular interactions inherent for ILs in aqueous solutions.

http://dx.doi.org/10.1007/s10953-015-0328-y

Keywords

Anion, Enthalpy of solution, Enthalpy of solvation, Intermolecular interactions, Ionic liquid, Solution calorimetry, Structure-property relations